

CLAIMS

I claim:

1. A winding machine for winding up bobbin material arriving from a feeding apparatus, comprising:

a winding spindle being designed and arranged to be rotated by a drive; and

a unit for determining a signal which is approximately proportional to the tension of the bobbin material, said unit including an arm being designed and arranged to be movable to a limited extent and only one roller being arranged at said arm, said only one roller being designed and arranged to guide the bobbin material to contact the feeding apparatus and said roller without contacting other elements in between.

2. The winding machine of claim 1, wherein said arm includes a bending bar and said unit includes at least one sensor for sensing deflection of said bending bar.

3. The winding machine of claim 1, wherein said arm is designed as a bending bar and said unit includes at least one sensor for sensing deflection of said bending bar.

4. The winding machine of claim 1, wherein said arm is designed and arranged as a scale beam and said unit includes at least one sensor for sensing the force of the bobbin material which subjects said one roller.

5. The winding machine of claim 2, wherein said bending bar includes a plurality of extensometer strips.

1 6. The winding machine of claim 3, wherein said bending bar includes a plurality of
2 extensometer strips.

1 7. The winding machine of claim 5, wherein said bending bar has a nominal bending
2 portion and said extensometer strips are arranged in said nominal bending portion.

1 8. The winding machine of claim 6, wherein said bending bar has a nominal bending
2 portion and said extensometer strips are arranged in said nominal bending portion.

1 9. The winding machine of claim 5, wherein said unit further includes a tubular housing
2 including a plurality of adjustable stops and said bending bar is arranged in said tubular
3 housing, said stops being designed and arranged to limit deflection of said bending bar in
4 said tubular housing.

1 10. The winding machine of claim 6, wherein said unit further includes a tubular housing
2 including a plurality of adjustable stops and said bending bar is arranged in said tubular
3 housing, said stops being designed and arranged to limit deflection of said bending bar in
4 said tubular housing.

1 11. The winding machine of claim 7, wherein said unit further includes a tubular housing
2 including a plurality of adjustable stops and said bending bar is arranged in said tubular
3 housing, said stops being designed and arranged to limit deflection of said bending bar in
4 said tubular housing.

1 12. The winding machine of claim 8, wherein said unit further includes a tubular housing
2 including a plurality of adjustable stops and said bending bar is arranged in said tubular

3 housing, said stops being designed and arranged to limit deflection of said bending bar in
4 said tubular housing.

1 13. The winding machine of claim 1, further comprising a traversing apparatus.

1 14. The winding machine of claim 1, wherein said bobbin material is sensitive.

1 15. A winding machine for winding up bobbin material arriving from a feeding apparatus,
2 comprising:

3 a winding spindle being designed and arranged to be rotated by a drive; and

4 a unit for determining a signal which is approximately proportional to the tension of
5 the bobbin material, said unit including:

6 a bending bar being designed and arranged to be movable to a limited extent,

7 one single roller being arranged at said bending bar, said one single roller

8 being designed and arranged to guide the bobbin material in a way to contact the
9 feeding apparatus and said roller without contacting other elements in between, and

10 at least one sensor for sensing deflection of said bending bar, said sensor
11 including a plurality of extensometer strips.

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1 16. The winding machine of claim 15, wherein said bending bar has a nominal bending
2 portion and said extensometer strips are arranged in said nominal bending portion.

1 17. The winding machine of claim 15, wherein said unit further includes a tubular housing
2 including a plurality of adjustable stops and said bending bar is arranged in said tubular
3 housing, said stops being designed and arranged to limit deflection of said bending bar in
4 said tubular housing.

1 18. The winding machine of claim 16, wherein said unit further includes a tubular housing
2 including a plurality of adjustable stops and said bending bar is arranged in said tubular
3 housing, said stops being designed and arranged to limit deflection of said bending bar in
4 said tubular housing.

1 19. The winding machine of claim 15, wherein said bobbin material is sensitive.

1 20. A winding machine for winding up bobbin material arriving from a plurality of feeding
2 apparatuses, comprising:

3 a plurality of winding spindles each being designed and arranged to be rotated by a
4 drive;

5 a plurality of traversing apparatuses each being designed and arranged to cooperate
6 with one of said winding spindles to wind up the bobbin material; and

7 a plurality of units each for determining a signal which is approximately proportional
8 to the tension of the bobbin material, each of said units including an arm being designed and
9 arranged to be movable to a limited extent and only one roller being arranged at said arm,
10 said only one roller being designed and arranged to guide the bobbin material to contact the
11 respective feeding apparatus and said respective roller without contacting other elements in
12 between.

1 21. The winding machine of claim 20, wherein said plurality of units are arranged in a
2 separate machine unit.

1 22. The winding machine of claim 20, wherein each of said arms includes a bending bar
2 and each of said units includes at least one sensor for sensing deflection of said bending
3 bar.

1 23. The winding machine of claim 1, wherein each of said arms is designed as a bending
2 bar and each of said units includes at least one sensor for sensing deflection of said bending
3 bar.

1 24. The winding machine of claim 20, wherein each of said arms is designed and
2 arranged as a scale beam and each of said units includes at least one sensor for sensing
3 the force of the bobbin material which subjects said one roller.

1 25. The winding machine of claim 22, wherein each of said bending bars includes a
2 plurality of extensometer strips.

1 26. The winding machine of claim 23, wherein each of said bending bars includes a
2 plurality of extensometer strips.

1 27. The winding machine of claim 22, wherein each of said units further includes a
2 tubular housing including a plurality of adjustable stops and said bending bar is arranged in
3 said tubular housing, said stops being designed and arranged to limit deflection of said
4 bending bar in said tubular housing.

1 28. A winding machine for winding up bobbin material arriving from a plurality of feeding
2 apparatuses, comprising:

3 a plurality of winding spindles each being designed and arranged to be rotated by a
4 drive;

5 a plurality of traversing apparatuses each being designed and arranged to cooperate
6 with one of said winding spindles to wind up the bobbin material; and

a plurality of units each for determining a signal which is approximately proportional to the tension of the bobbin material, each of said units including:

a bending bar being designed and arranged to be movable to a limited extent, one single roller being arranged at said bending bar, said one single roller being designed and arranged to guide the bobbin material in a way to contact the feeding apparatus and said roller without contacting other elements in between, and at least one sensor including a plurality of extensometer strips for sensing deflection of said bending bar.

29. The winding machine of claim 28, wherein each of said units further includes a tubular housing including a plurality of adjustable stops and said bending bar is arranged in said tubular housing, said stops being designed and arranged to limit deflection of said bending bar in said tubular housing.

30. The winding machine of claim 28, wherein said plurality of units are arranged in a separate machine unit.